



# Education and Promotion Physics and HEP, Serbia

---

**Goran S. Djordjević**

Department of Physics,  
University of Niš

& SEENET-MTP Centre Niš

*RECFA visit to Serbia  
November 29, 2024*

# UNIVERSITY SYSTEM – PHYSICS IN SERBIA

- University centres – Faculty/Departments in Physics:

**Belgrade, Novi Sad, Niš, Kragujevac, K. Mitrovica.** A Program in ``Physical Electronics`` exists at the ``School of Electrical Engineering``, Belgrade (No. of students at the 1<sup>st</sup> year in average – app (~ 30/10/1-2).

- Serbia higher education implements the Bologna system, first and second cycle:
- BSc: 3 years (Nis University), or 4 years (others), no thesis
- MSc: 2 years (Nis University), or 1 year (others), thesis (0-1 semester)
- No specific programs for HEP. The closest is B and M programs ``for researchers`` in Belgrade.
- PhD is 3 years, can be extended. PhD Study does not exist in K. Mitrovica
- Basically, 2 years of courses (often spread out over PhD)
- There are several possibilities for funding during PhD study
- Usually, students from Serbia, in some cases: students from Bosnia and Herzegovina, Montenegro and other republics of ExYu.

## Undergraduate (Total number of students)

SER/Year	2014 (M/F)	2015 (M/F)	2016 (M/F)	2017 (M/F)	2018 (M/F)	2019 (M/F)	2020 (M/F)	2021 (M/F)	2022 (M/F)	2023 (M/F)	2024 (M/F)
Belgrade	448						359	323	292	288	269
Novi Sad	321	310	295	293	258	226	216	208	191	/	/
Niš*	96 (41/55)	104 (54/50)	86 (41/45)	86 (37/49)	66 (26/40)	73 (33/40)	68 (31/37)	54 (24/30)	55 (24/31)	47 (18/29)	46 (21/25)
Kragujevac											
K. Mitrovica**	12 (4/8)	11 (3/8)	8 (6/2)	15 (6/9)	9 (4/5)	10 (3/7)	11 (4/7)	6 (2/4)	3 (0/3)	3 (1/2)	/

## Master (Total number of students)

SER/Year	2014 (M/F)	2015 (M/F)	2016 (M/F)	2017 (M/F)	2018 (M/F)	2019 (M/F)	2020 (M/F)	2021 (M/F)	2022 (M/F)	2023 (M/F)	2024 (M/F)
Belgrade	?							50-100	50-100	50-100	50 - 100
Novi Sad	51	/	58	44	29	33	37	43	29	/	/
Niš*	16 (8/8)	18 (8/10)	20 (8/12)	19 (8/11)	24 (13/11)	23 (9/14)	20 (9/11)	17 (7/10)	12 (6/6)	18 (9/9)	16 (7/9)
Kragujevac	?										
K. Mitrovica	9 (4/5)	7 (4/3)	9 (5/4)	10 (3/7)	9 (4/5)	17 (3/14)	11 (5/6)	10 (4/6)	8 (3/5)	7 (0/7)	/

## PhD-DAS (Total number of students)

SER/Year I   I 2	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Belgrade							104	112	124	121	129
Novi Sad	21	/	25	21	36	38	31	37	39	/	/
Niš*	21 (14/7)	20 (14/6)	20 (15/5)	13 (10/3)	13 (9/4)	16 (10/6)	21 (14/7)	15 (8/7)	14 (6/8)	13 (7/6)	13 (8/5)
Kragujevac	?										
K. Mitrovica***											

\*) 3+2 years

\*\*) Only 1st Year

\*\*\*) No PhD study

## No. of the students enrolled in the first year of the study

SER/Year	2016 OAS/MAS/PhD (M/F)	2017 OAS/MAS/PhD (M/F)	2018 OAS/MAS/PhD (M/F)	2019 OAS/MAS/PhD (M/F)	2020 OAS/MAS/PhD (M/F)	2021 OAS/MAS/PhD (M/F)	2022 OAS/MAS/PhD (M/F)	2023 OAS/MAS/PhD (M/F)	2024 OAS/MAS/PhD (M/F)
Belgrade	136/66/				61/80/-	60/65/-	55/57/-	57/55/-	61/46/-
Novi Sad									
Niš	26/7/5 (14/12/4/3/4/1)	26/5/0 (11/15/3/2/0)	5/8/2 (1/4/1/5/3/0/2)	18/5/3 (12/6/0/5/2/1)	11/6/5 (9/2/3/3/4/1)	5/2/1 (1/4/0/2/0/1)	9/3/2 (5/4/1/2/1/0/2)	6/9/1 (1/5/4/5/1/0)	8/2/2 (5/3/0/2/1/1)
Kragujevac	15/9/- (7/8/1/8/-)	9/11/- (5/4/4/7/-)	27/7/- (17/10/3/4/-)	21/7/- (14/7/4/3/-)	17/5/- (7/10/0/5/-)	13/3/- (7/6/1/2/-)	13/13/- (6/7/5/8/-)	10/2/- (3/7/2/0/-)	7/3/- (3/4/0/3/-)
K. Mitrovica***	8/9/-	15/10/-	9/9/-	10/17/-	11/11/-	6/10/-	3/8/-	3/7/-	-

\*\*\*) No PhD study

## No of the students completed BAS/MAS/PhD-DAS study in Physics, Serbia

SER/Year	2014 OAS/MAS/DAS (M/F)	2015 OAS/MAS/DAS (M/F)	2016 DAS/MAS/DAS (M/F)	2017 OAS/MAS/DAS (M/F)	2018 OAS/MAS/DAS (M/F)	2019 OAS/MAS/DAS (M/F)	2020 OAS/MAS/DAS (M/F)	2021 OAS/MAS/DAS (M/F)	2022 OAS/MAS/DAS (M/F)	2023 OAS/MAS/DAS (M/F)	2024 OAS/MAS/DAS (M/F)	Total Aver-Y (M/F)
Belgrade		57					70	91/-	75/-	61/	59+/-	413/- 69/-
Novi Sad												
Niš	7/2/2	6/5/1	4/6/5	6/1/2	4/5/0	6/6/0	2/3/5	3/8/3	9/2/2	1/3/0	-/-/-	48/41/20 4.8/4.1/2
Kragujevac					8/10/-	6/7/-	10/5/-	1/8/-	15/?/-	5/4/-	8/7/-	53/41/- 7.6/5.9/-
K. Mitrovica						53/73/- 17/36/25/48/-						53/73/- 5.3/7.3/- 1.7/3.6/2.5/4.8/-

## T&R Staff Physics, Universities, Serbia – 2024

SER\Status	Lecturers (PhD)	Teaching and Research Assistants	Researchers (PhD)	Total
Belgrade	48	3+35 = 38	8	94
Novi Sad	27	4+3= 7	6	40
Niš	23	2+3 = 5	1	29
Kragujevac	14	5+2=7	1	22
K. Mitrovica	6	3	/	9
<b>Total</b>	<b>118</b>	<b>60</b>	<b>16</b>	<b>194</b>

**Male – 109 ~ 56.2%**

**Female – 85 ~ 43.8%**

# ELEMENTARY AND HIGH SCHOOLS

- Number of elementary schools – around 1300 in 2024 (8 years schools)
- Number of High schools – around 550 in 2024 (mostly 4 years schools)
- 60.000 to 70.000 pupils per generation
- Physics ``starts`` as an independent subject at 6<sup>th</sup> class of the elementary schools.



# SOME SPECIFITIES – „CLASS(ES) FOR GIFTED PUPILS

- High school – Grammar - *class* for *students* with special abilities in physics in Serbia (authors GSDj and Lj. Nestic, Nis University):
- Niš (since 2003) 22 generations, about 200 pupils
- Zemun-Belgrade and Novi Sad (since 2015)
- National Importance: Mathematical Gymnasium Belgrade (since 1966, V. Dajovic)
- **Evaluation of high school programme for gifted pupils in Physics and Sciences in Serbia - experience in regional cooperation - SEENET-MTP network**  
*G.S. DJORDJEVIC, D. PAVLOVIC-BABIC, J. STANKOVIC (RRP 2012)*

[https://rrp.nipne.ro/2012\\_64\\_2/art24Garabet.pdf](https://rrp.nipne.ro/2012_64_2/art24Garabet.pdf)



# PETNICA SCIENCE CENTRE (PSC)

Petnica



- PSC is an independent, nonprofit organisation for extracurricular, formal and informal, science education.
- PSC was established in 1982.
- The Center is in Petnica, a village 7 km SE of Valjevo, and 99 km SW of Belgrade.
- Educational programs in Petnica are not linked with school curriculums, nor do they apply the usual school teaching methods. Targeting students aged 14-20, Petnica's educational activities cover a broad spectrum of disciplines in sciences, humanities ... . A variety of programs, including students' and teachers' ones.
- About 20 Programs/Seminars for: a) Elementary School pupils and, b) High School Pupils.
- **PHYSICS**
- Elementary school pupils (3 seminars per year)
- High school pupils (4 seminars per year – problem/project oriented).
- The completed and the best projects used to be presented and published at the Annual
- 58 programs in physics since 1988. 4953 pupils, 64,5% M and 35,5% F.

Petnica conference: [.https://konferencija.petnica.rs/](https://konferencija.petnica.rs/)





# OUTREACH HEP

## Science education:

### High-school teacher programs:

- High School Teachers Programs @CERN, every 3-4 years
- Support teachers' seminars and workshops to educate them in CERN programs

### High-school student programs:

- Masterclass organised in 5 cities in Serbia - can accommodate more than 100 students per year
  - Helped with the start of the program in Montenegro
  - Helping with a program in Banja Luka in the Republic of Srpska in Bosnia and Hercegovina

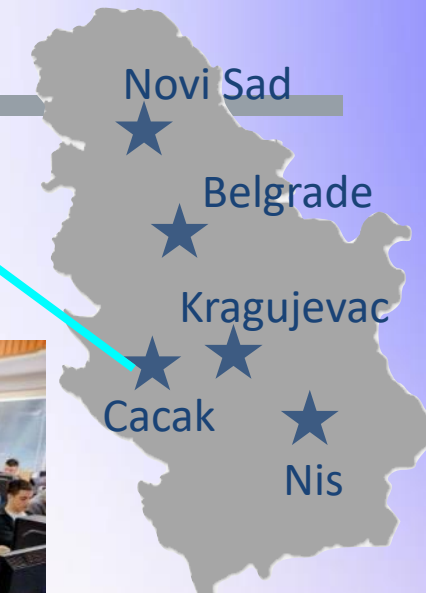
## Outreach activities:

### Public events: Public lectures, forums, panels, CERN events.

- Two lecture series at Kolarac hall
- Many public lectures all over Serbia

### Outreach: Center for the Promotion of Science organises numerous events

- Organised "Science at the bar" together with the Embassy of Israel
- CERN exhibition opening tonight





# OUTREACH – PROMOTION (NIS)

- Joint programs of ``Alfa`` Astronomical society and Faculty of Science Nis:
- 7 projects in the period (2012 – 2023) (Total budget 25.000 EUR)
- The main funder Centre for promotion of science Serbia
- More than 70 lectures and 40 public observations.,
- Numerous visits of the neighboring towns and villages.
- The modern dome and automatized telescope: obtained and operative.
- \*\*\*
- Project Promotion of Physics and Science-Southeast Serbia (5 years, with the Ministry of Science and Education)
- City Schools and Winter seminars with Physical society Nis (since 2006, with some interruptions)
- \*\*\*
- FizNis (LjN) (2018-2019)
- Faculty of Science Nis, Science school for pupils (2023-)



# CERN MASTERCLASS, CULTURAL COLLISIONS, YOUNG MINDS ... (NIŠ)

- **1. CERN Masterclass since 2016, in average 30 pupils annually.**
- **2. Cultural Collisions – Science and Art (2022-)**

Series of lectures and 3 permanent exhibitions (Belgrade, Novi Sad, Niš)

Supported by: Austrian Cultural Forum Belgrade, ORIGIN, Universities of Niš, Novi Sad and Belgrade, Swiss Office for Cooperation at Swiss Embassy Belgrade, Center for the Promotion of Science in Serbia
- **3. ENJOY PHYSICS (2019-)**
- Joint program of: Young Minds (European Physical Society), Young Minds and Physical Society Nis, SEENET-MTP Centre
- Based on lectures from researchers and students from SE Serbia
- Specific outreach programs exist in Novi Sad and Kragujevac ...





# YOUNG MINDS – WITH EPS



Young Minds Seminars, 2019  
„Between the Lines and Out of the Box: Seminars for Aspiring Young Physicists”

*Fully done by students ...*





# SEENET-MTP AND BPU - NETWORKING

- Southeastern European Network in Mathematical and Theoretical Physics (SEENET\_MTP), established in 2003, with support of Julius Wess and his ``WIGV`` initiative.
- SEENET-MTP in numbers: Institutions (14+11=) 25, Individual members 490
- Exchanges 410 & joint papers 350
- Conferences 38 with about 1950 participants
- A reach program of Promotion through Balkans since 2005, with UNESCO
- Total No. of Projects 18. Total budget of the Network ~ 1,5 MEUR
- PhD Programs – 3 cycles (CERN-SEENET, with ICTP and EPS), <https://phd.seenet-mtp.info/>
  - 12 Schools and Seminars 2014 – 2024.
- Other schools (P. Milenovic):
  1. Trans-European School of High Energy Physics 2021, Petnica (13-20th Jul 2012),
  2. CERN Danube School on Instrumentation, Novi Sad (8-13th Sep 2014).
  3. 14th Thematic CERN School of Computing (tCSC 2024), Belgrade (June 9-15, 2024).
- Balkan Physical Union (BPU) joint organization of 6 Balkan Physics Olympiad and the 11<sup>th</sup> Bakan Physical Union Congress (Belgrade 2022) with 500 participants and 4 satellite events.
- <https://balkanphysicalunion.info/> ; <https://bpu11.info/>



BW2003 Vrnjacka Banja 2003



CERN SEENET School, Thessaloniki 2024

# PISA test in Serbia, with accent on "science"

„Science literacy“

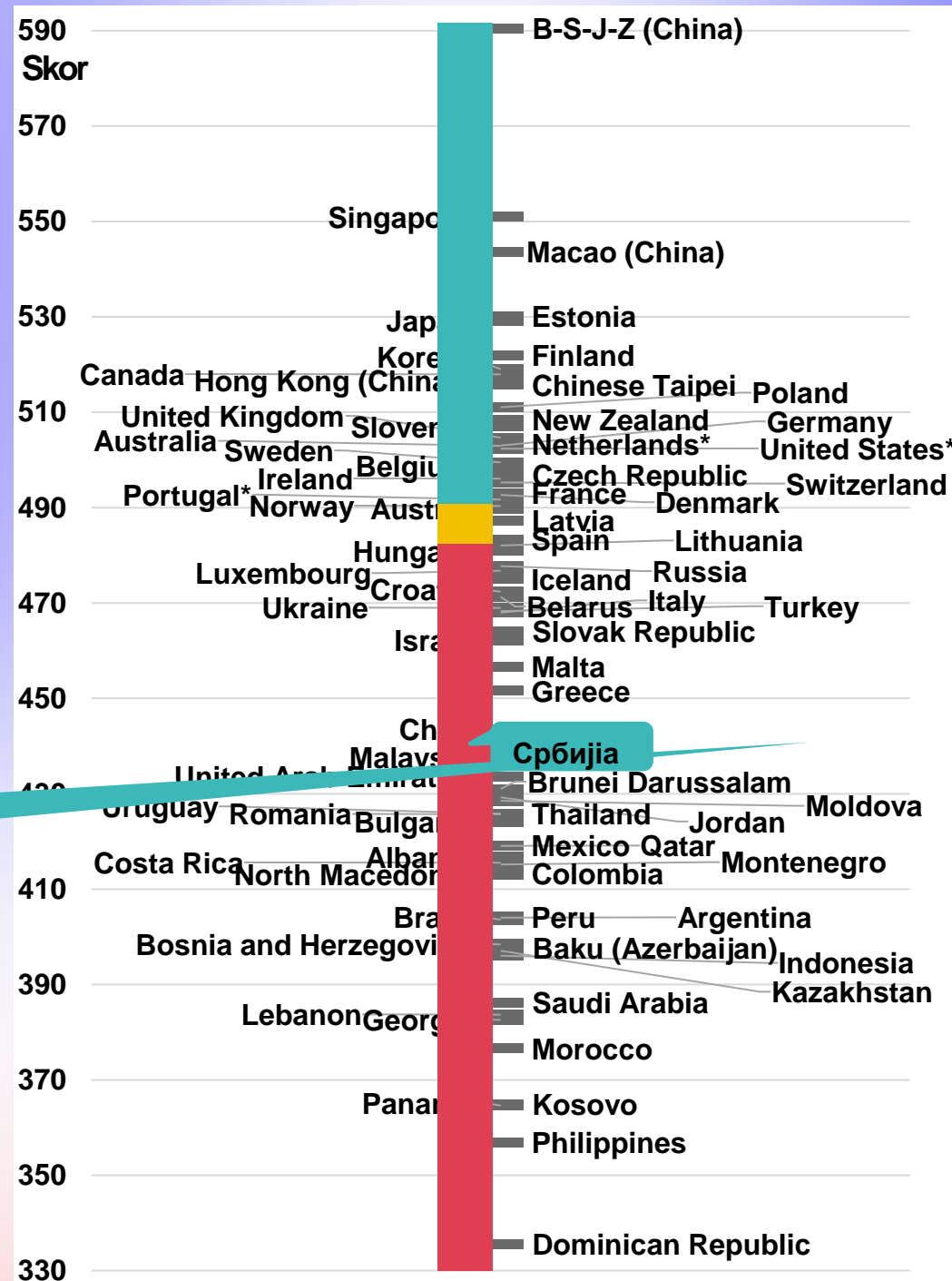
Statistically, significantly, above OECD average

Around OECD average

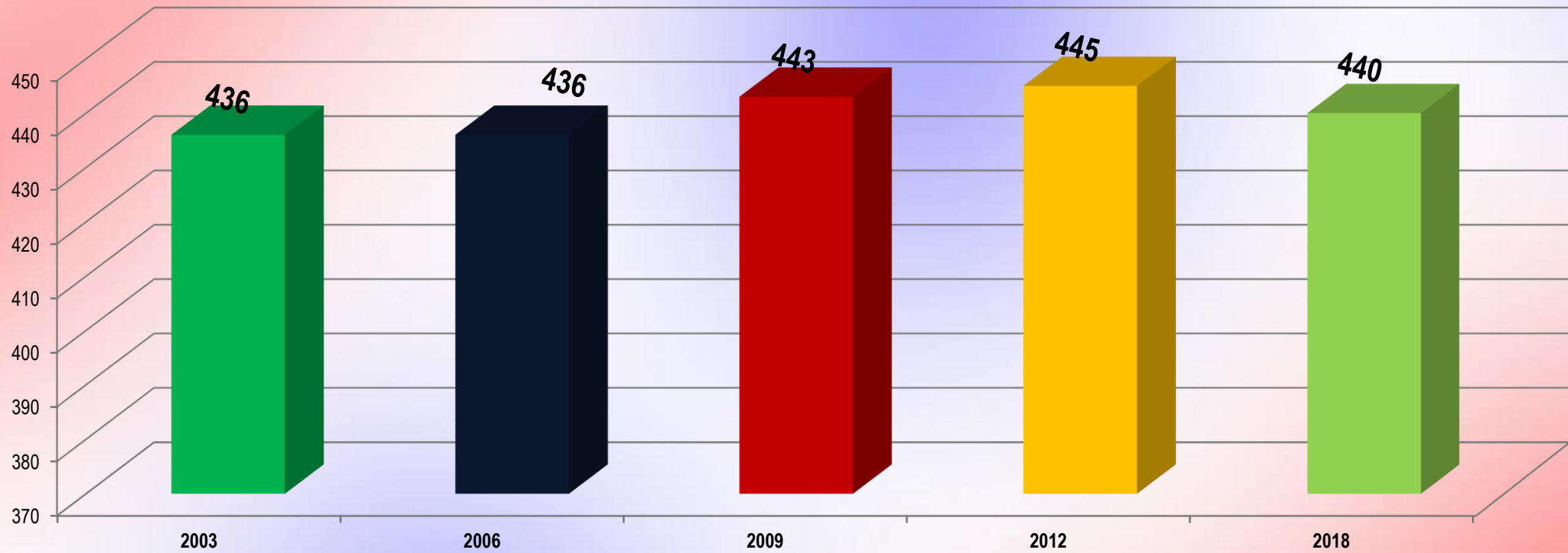
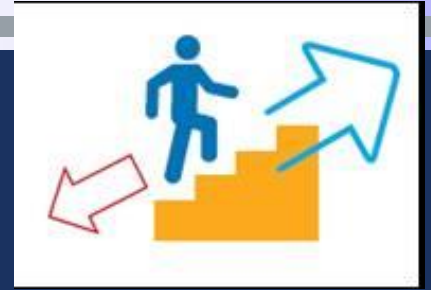
Statistically, significantly, below OECD average

Serbia 2018 average score: 440 points  
Serbia 2012 average score: 445 points

No significant changes since the first test

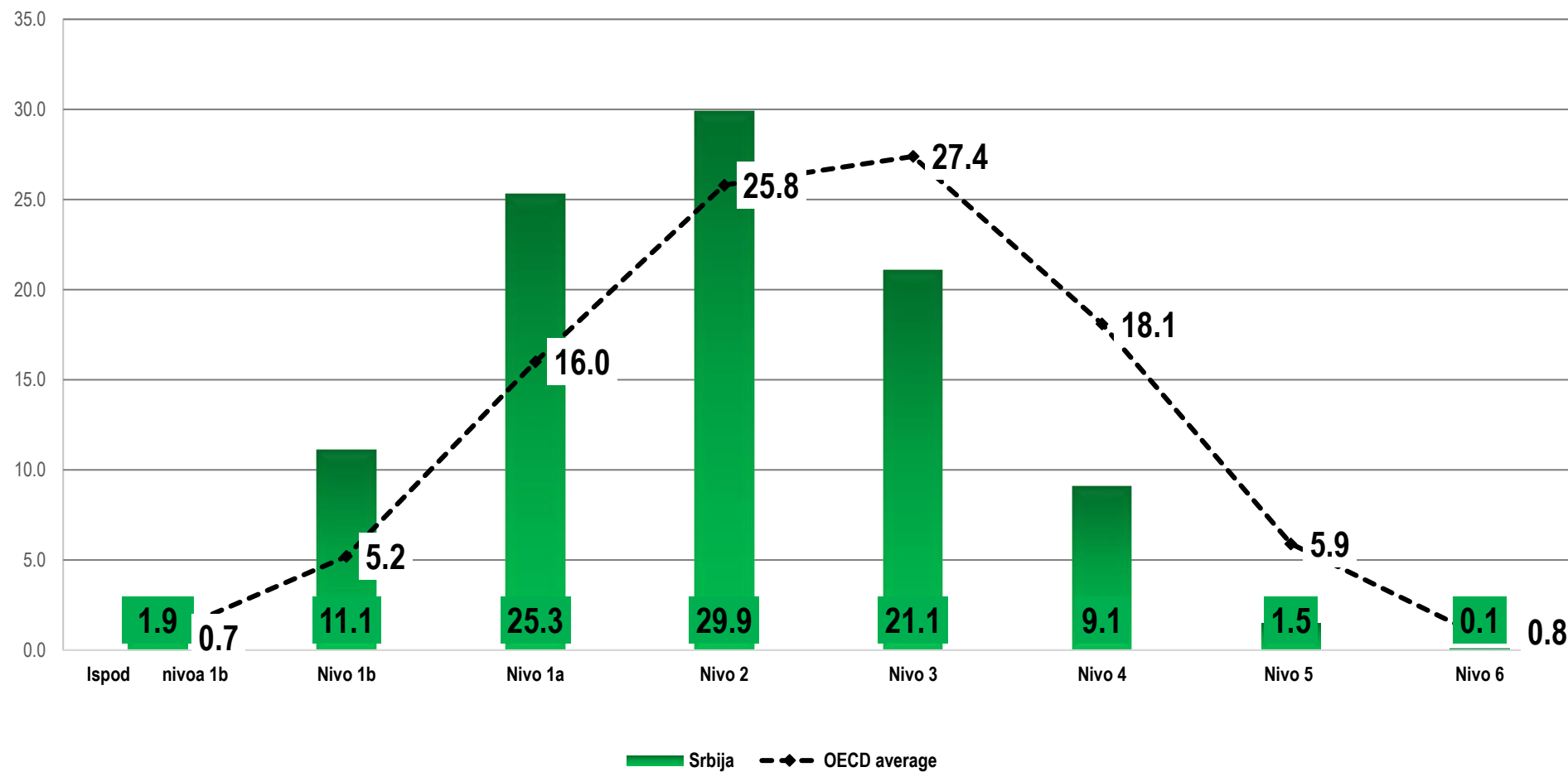


# „SCIENCE LITERACY“ SERBIA TREND



- Asdf

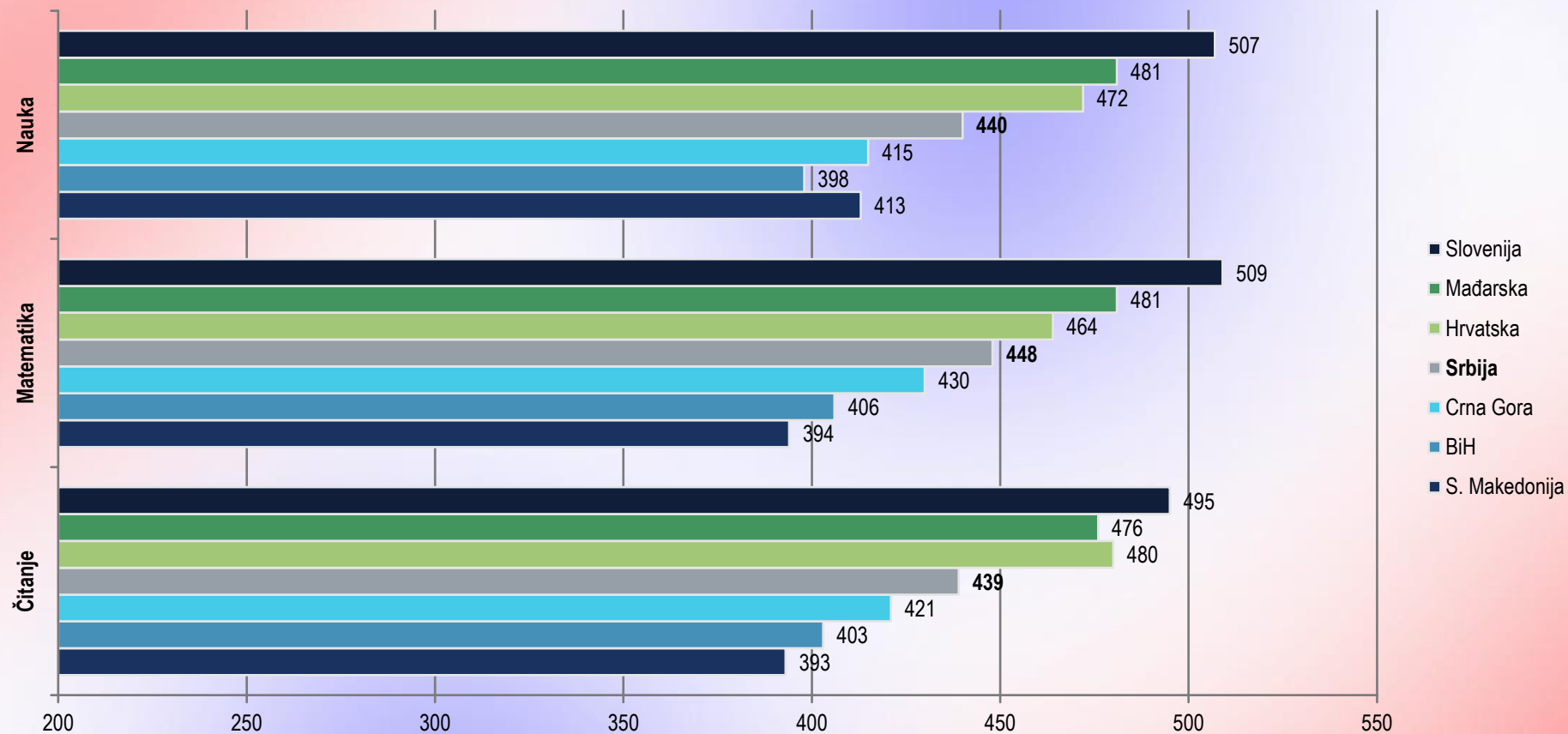
# DISTRIBUTION BY THE LEVEL OF ATTAINMENT



- Asdf



# ON ATTAINMENTS, IN RELATION TO THE REGION



# „SCIENCE LITERACY“, AVERAGE ATTAINMENT BY THE CYCLE, SERBIA

OECD/PISA Science literacy	
Cycle	Serbia, Average attainment
2000	-
2003	436
2006	436
2009	443
2012	445
2015	-
2018	440
2022	447

# COMMUNICATION: PUBLIC EVENTS



- The CERN community in Serbia is actively involved in numerous **outreach and science popularization programs** organized across the country, ranging from science festivals to highly attended **popular science panels** hosted by the Institute of Physics Belgrade (IPB) at the Student Cultural Center.
- Regular programs include **CERN lecture series** held at the Kolarac Concert Hall.
- Special **CERN guest lectures** are organized at the National Museum of Serbia.
- Public events attract significant media attention and **large audiences**.



# COMMUNICATION: MEDIA ACTIVITIES



- The IPB's Communications Department, in collaboration with other organizations such as the CPN, actively works with the media to promote information about High Energy Physics. Guests from CERN and local HEP scientists frequently give statements to the media.
- **Media interest in CERN in Serbia** is significant and overwhelmingly **positive**. There are virtually no negative stories about Serbia's participation in CERN.
- Greater interest is also achieved through specialized portals like *Science Through Stories*, developed at the IPB, where **popular science stories** are regularly published.



# COMMUNICATION: EPPCN



European Particle Physics  
Communication Network

- European Particle Physics Communication Network (EPPCN) is an important network that facilitates exchange of information among HEP communicators in CERN member countries. Serbia has an active **representative in the EPPCN** from the IPB's Communications Department.
- **Serbia hosted the EPPCN meeting** in May 2023.
- The organization's new logo, adopted in 2023, was designed by **Serbian designer** Vladimir Stankovski.
- In the November 2024, EPPCN members unanimously **elected a new co-chair, the Serbian representative** Slobodan Bubnjević.

# Future ...



The poster features a stylized illustration of a winding dirt road through a landscape. In the foreground, a wooden cart pulled by two horses carries a person and a laptop. The background shows rolling hills with a satellite dish, wind turbines, and a nuclear power plant under a bright sun.

**BPU11 CONGRESS**  
11th International Conference of the Balkan Physical Union  
28 August – 1 September 2022, Belgrade, Serbia

 **BAKLAN PHYSICAL UNION**  
FOUNDED 1985

**Scientific Sections**  
Nuclear Physics and Nuclear Energy; Astronomy and Astrophysics; Gravitation and Cosmology; Atomic and Molecular Physics; High Energy Physics (Particles and Fields); Condensed Matter Physics and Statistical Physics; Optics and Photonics; Plasma and Gas-Discharge Physics; Theoretical, Mathematical and Computational Physics; Meteorology and Geophysics  
Environmental Physics – Alternative Sources of Energy; Physics of Socioeconomic Systems and Applied Physics; Biophysics and Medical Physics; Physics Education, History and Philosophy of Physics; Metrology and Instrumentation

**Satellite Meetings and Events**  
<https://bpu11.info/satellite>

**International Advisory Committee**  
Zoran Popović, cochair  
Radu Constantinescu, cochair

**International Organizing Committee**  
Goran Djordjević (BPU president), cochair  
Luc Berge (EPS president), cochair

**International Scientific Committee**  
Antun Balaž, cochair  
Jugoslav Karamarković, cochair  
Nenad Lazarević, cochair

  
**Partners and Sponsors**  
VINCA INSTITUTE OF NUCLEAR SCIENCES  
MATP  
IPB  
CEI  
EPJ.ORG  
www.bpu11.info  
bpu11@bpu11.info